

## ENVIRONMENTAL EDUCATION PROGRAM FOR SHIFTING CULTIVATORS: THE EAST TIMOR CASE

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### *Background*

Shifting cultivation (or swiddening) represents a primitive agricultural system in which an area of land is first cleared (slash-and-burn farming) by felling trees and cutting back shrubs. Then the stumps and herbaceous plants are burnt off and crops are grown. Because prevailing ecological conditions will not support permanent forms of agriculture (at least with traditional technology), farmers move to a new area where the process is repeated. The system does not require fertilizer inputs and little weed or pest control, but uses a great deal of land. This type of agriculture was practised extensively in Europe in Neolithic times<sup>2</sup> and more recently in many areas of the tropics such as Southeast Asia.<sup>3</sup>

In East Timor, this practice has also become a 'culture' amongst the poor Timorese scattered along the north coast of the island. The relative treelessness of the coast may in part be caused by the frequency of burning. The 'myth' behind the burning practice is that, the burning of grass and trees provides nutrients to the soil (it is believed that the ash turns into a 'fertiliser' when the rain begins). This pre-

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<sup>2</sup> See, for example, Allaby, M., *Macmillan Dictionary of the Environment*, 3rd edition [London: The Macmillan Press Ltd., 1988], pp. 374-5.

<sup>3</sup> Spencer, J.E., *Shifting Cultivation in Southeastern Asia* [Berkeley: University of California Press, 1977], p. 13.

historic agricultural practice is misconceived and unsustainable. Movement from one site to another has become an integral part of their balanced economic system. However, due to the fragility of the ecosystems within which they operate, they cannot afford to over-exploit the natural resources upon which they depend. The growth of population along the coast has exerted enormous pressure on these very limited resources causing major soil changes.

Although the practice of shifting cultivation is a result of a complexity of factors, it is my belief that one of the most important strategies to overcome the practice is education. We need an educated/ knowledgeable public and (especially) bureaucracy to appreciate that forests and forested areas are an important life-support system. Through education the rural poor can eventually engage in a more productive form of employment than agriculture in marginal areas.

### *Introduction*

It is, therefore, necessary that a model for environmental education be developed in order to minimise such agricultural malpractices. Ecological literacy can have a profound effect in bringing better understanding about Nature and our part in it. In the long-term, education can change people's lifestyles, thus improving their relationship with nature. In this context, education should be re-directed, re-designed and relevant to the prevailing conditions.

By developing a practical tool, it is hoped that everyone, the rural poor and the technocrats will be motivated, to involve themselves in changing development policies so that they are in line with sound ecological principles. This paper attempts to develop a practical model for swiddeners in East Timor that might have a direct impact on the cognitive and affective outcomes for individuals.

### *Shifting Cultivation and the Environment*

The practice of shifting cultivation has become a threat to the environment in East Timor, particularly in the north coast of the island. Forests have been burnt and have disappeared since the 1980s. The soils in deforested areas have been degraded through improper land use. The impact of these problems are cumulative and can affect this entire region.

Policy makers have discussed such environmental problems at macro levels which is an initial indication of land care awareness. However, solutions to these problems also rest with each land user and his/her land-use practices. The connection between the land users and their land-use practices within a sustainable development framework is problematic. Thus, a more appropriate long-term strategy is necessary to help protect the environment that is already at risk.

Undoubtedly, deforestation and its consequent environmental damage affect the lives of people directly. Land users will have to change their lifestyles to prevent further environmental destruction. Thus, programs and activities should be of direct concern to those involved with environmental protection and improvement. Shifting cultivators cannot be isolated from this interplay.

Since the late 1980s, East Timor has suffered from severe deforestation. The following table shows that the level of deforestation is more intense in the north coast of the island than in the south coast. As can be seen from Table 1, the cumulative area deforested in just five years reached 16,137 hectares which represents 3.41% of the total forest area of 472,877 hectares. This relative high level of deforestation is very significant to the whole ecosystem of this region.

**Table 1: Area Deforested Yearly in East Timor, 1989-93**

(In hectares)

| Area         | 1989 | 1990 | 1991 | 1992 | 1993 |
|--------------|------|------|------|------|------|
| <b>North</b> | 29   | 1750 | 5630 | 300  | 2600 |
| <b>South</b> | 925  | 1036 | 2622 | 102  | 843  |
| <b>Total</b> | 954  | 2786 | 8252 | 402  | 3443 |

Source: Bappeda, 1994:208.

It is important to note that the figures have not included the level of deforestation as a result of incineration for military control in the early years of the invasion of East Timor in 1975. Vast areas of formerly natural rainforest have been cleared (burnt) and badly damaged for better military surveillance of guerillas leaving these areas at risk.

Given the fact that deforestation is proceeding at a rate many times greater than what has been recorded (due to security and political considerations), it has brought different impacts at the local level. As Arnold <sup>4</sup> pointed out, often the consequences of deforestation cannot be assessed precisely, but they can be real and costly nonetheless.

Locally, the rural poor feel the effects first as deforestation progresses and trees and other forest products such as honey, bamboo, and fuelwood become scarce. This situation leads to impoverishment as the poor have no choices and depend upon these for their survival.

Moreover, the most significant loss for the rural poor who mostly depend upon simple agricultural techniques may be the declining production of annual crops. On the north coast of East Timor island, the massive reduction in forest cover by slash-and-burn is probably associated with decreased rainfall infiltration, increased runoff, accelerated water erosion and loss of organic materials in the soil.

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<sup>4</sup> Arnold, J.E.M., 'Deforestation' In D.J. McLaren and B.J. Skinner, eds., *Resources and World Development* [New York: John Wiley and Sons, 1987], pp. 711-25.

For example, inundation is a periodic event in Dili, the capital city of East Timor, because material from the slopes is carried into the town from past deforestation.<sup>5</sup> Linked to increased runoff is the decline of the water table leading to drying up of shallow wells. It is reported that the Dili ground water table has lowered 2-3 metres due to insufficient water capture.<sup>6</sup>

At the regional level, deforestation has contributed to a decline in sandal trees, one of East Timor's strategic commodities, leading to a dramatic decline in production and export. For example, the production of sandalwood recorded in 1987 was 320 tons, but plummeted to 11 tons in 1991. This has resulted in a decline in the export of sandalwood oil and powder. Table 2 gives an indication of sandalwood loss as a result of deforestation. It should also be noted that the figures provided in the table do not include the massive destruction of sandal trees in the early 1980s by army personnel.

**Table 2: Production and Export of Sandalwood Products in East Timor, 1987-91**  
(In tons)

| <i>Product</i>           | <i>1987</i> | <i>1988</i> | <i>1989</i> | <i>1990</i> | <i>1991</i> |
|--------------------------|-------------|-------------|-------------|-------------|-------------|
| <b><i>Production</i></b> |             |             |             |             |             |
| <b><i>Wood</i></b>       | 309         | 149         | 17          | 57          | 11          |
| <b><i>Oil</i></b>        | 7           | 8           | 3           | 3           | 3           |
| <b><i>Powder</i></b>     | 198         | 136         | 34          | 77          | n.a.        |
| <b><i>Export</i></b>     |             |             |             |             |             |
| <b><i>Oil</i></b>        | 2.3         | 5.6         | 6.3         | 1.8         | n.a.        |
| <b><i>Powder</i></b>     | 109.7       | 200.4       | 75          | 57          | n.a.        |

Source: Bappeda, 1994:208.

Legend: n.a. -> no data available

<sup>5</sup> Biro Lingkungan Hidup (1993) *Neraca Kependudukan dan Lingkungan Hidup Timor Timur*. Pemerintah Daerah Tingkat I Timor Timur, p. 40.

<sup>6</sup> Biro Lingkungan Hidup, *Op. Cit.*, p. 67.

### *Factors Influencing Shifting Cultivation*

In the case of East Timor, the recent practice of shifting cultivation has its roots in forced resettlement, poverty and lifestyle traditions/ patterns, the latter being the most significant element. The term poverty here is used in absolute and not in relative terms, that is, the deprivation of the basic needs of life and the inability of the individual or household to obtain the minimum amount of goods and services needed to rise above the poverty line. Here, poverty is measured in terms of life expectancy, literacy, nutritional standards, and real income. The following indicators show that the majority of the Timorese people live below the poverty line or in absolute poverty. For example, the present Gross Domestic Product per capita of East Timor is US\$280 per year; life expectancy at birth is 55 years; literacy rate: 40%; Infant Mortality Rate: 97/1000 births; and nutritional standards: less than 2000 calories/person/day.<sup>7</sup>

Poverty has become more intense and widespread because the native Timorese have been displaced from their homelands, many being resettled by the Indonesian army forces to unfamiliar and fragile environments in the north coast. The political situation has intensified environmental problems. Moreover, many families were moved on three or more times during resettlement, each move causing yet more rainforest clearance. Because the yields of thin, infertile soils decline sharply after a couple of years of cultivation, swiddeners are forced to move to another fragile location, leaving their land to lie fallow for many years before it can be cultivated again.

The massive concentration of poor families in fragile coastal areas such as Dili, the capital city of East Timor, has limited the access to agricultural land. For example, according to land use patterns,<sup>8</sup> only 25.6 square kilometres or 6.89% of the total land of Dili is suitable for growing staple foods such as maize and

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<sup>7</sup> Bappeda, *Op. Cit.*, p. 367.

<sup>8</sup> *Ibid.*, p. 11.

tubers. Likewise there can be no denying that these cultivators do not produce a large economic return from their cropping activities. This situation becomes more complicated where these cultivators have no choice but to exploit the devastated lands surrounding the capital. As a matter of fact, the treeless mountains surrounding Dili form a critical area of approximately 15,000 hectares. These mountains were formerly covered by a great variety of trees such as *Eucalyptus urophylla*, *Eucalyptus alba*, *Schleichera oleosa*, *Aquilaria Sp.*, *Tamarindus indica*, *Maorosa*, *Santalum album*, and other native trees <sup>9</sup> that have disappeared since the 1980s due to frequent burning and cutting.

The slash-and-burn method has become a common practice amongst the poor peasants practically throughout the north coast of the island. Such a lifestyle tends to perpetuate itself because local authorities do not have the resources to police the areas at risk.

Moreover, it appears to be difficult to upgrade shifting cultivation and/or change the practice into a more productive and permanent agriculture if it is not accompanied by a change in the whole socio-economic and political system of this region. The abolition of shifting cultivation, through prohibition of burning the forests and cutting down the trees without upgrading the cultivators' economy, can only increase the number of poor people. Although it is believed that upgrading the cropping system may work better than simple prohibition, the agricultural and forestry agencies in East Timor have failed to raise people's awareness of forests and forested areas. The Indonesian government has spent millions of rupiahs yearly on reforestation projects, but this has in fact not been at all successful. Part of this failure is due to the top-down approach which reflects the project-oriented focus rather than a process-oriented approach. In addition, consideration for the involvement of the local community, a potential in the process of reshaping the

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<sup>9</sup> *Ibid.*, p. 206. Also, Metzner, J.K., *Man and Environment in Eastern Timor: a geo-ecological analysis of the Baucau-Viqueque Area as a possible basis for regional planning*. Development Studies Centre, Monograph No. 8 [Canberra: The Australian National University, 1977], pp. 91-115.

critical areas, had been minimal in the initial planning and management of the forests. Until now this potential has been ignored largely because forests have not been taken into account by policy makers.<sup>10</sup> It is not the emphasis of this paper to examine the relationship of environmental problems to political or security approaches, although to find solutions to such environmental problems one cannot ignore the significance of their connection. Thus in the case of East Timor, the roots of the problems are far more complex than simply resettling the cultivators and asking them to plant trees. Still, the best long-term hope for an environmentally literate society lies in education to overcome the people's traditional attitudes towards the environment as a whole.

#### *Long-term Solution: Education*

Despite huge amounts of funds being allocated for reforestation, the level of general public environmental literacy remains far from adequate. The lack of a more comprehensive, effective and integrated environmental education program has meant that individuals are generally quite ignorant about the total environment and its associated problems.

Obviously, informal-learning, a non-academic orientation and people-centered is probably the most efficient strategy to deal with people's behaviour, because it is more problem-oriented rather than discipline-oriented.<sup>11</sup> One of the aims of environmental education is to transform attitudes and behaviour patterns and empower citizens to act and react perceptively in situations involving

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<sup>10</sup> This is based on my personal observations that I have made during my six years of work experience in BAPPEDA (the *East Timor Regional Development Planning Board*).

<sup>11</sup> See, for example, Ben-Peretz, M., 'Environmental education is too important to be left in the hands of teachers alone' in Trilochan S. Bakshi and Zev Naveh, eds., *Environmental Education: Principles, Methods, and Applications* [London: Plenum Press, 1980], p. 19.

environmental quality.<sup>12</sup>

As we have seen, effective people's involvement and/ or participation in development cannot simply be proclaimed; it has to be developed. People's involvement must be seen in part as an educational process and that the demands of this process must be considered in any environmental education project design. Peter Oakley *et al.*, suggested two distinct interpretations of this educational process:

- *Education as information*: Where the educational element is a participatory project consists essentially of informing people about a project and preparing them to contribute to its implementation. In this approach people are educated for a predetermined project and, although they may be consulted or given a limited voice, the education is concerned to prepare them to participate within already defined parameters.

- *Education as awareness*: Where the educational element is a participatory project is more concerned to break people's mental isolation, to reverse the deeply embedded feelings of inability and inferiority and to prepare people to explain things as they see them, to speak out, to analyse, to plan and to carry through a course of planned action. This form of education liberates people from the moulds of deference and impotence and provides the basis for their active involvement in development.<sup>13</sup>

'Education as information' is a conventional approach often used in governmental projects as tools of socialisation, depolitisation and disempowerment. In the case of the reforestation projects in East Timor, such an approach has been used to simply meet project objectives with some involvement of different groups of people. Here, the people are 'informed' (normally through long and routine speeches by the Governor of East Timor and the Head of the Forestry Department) about the

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<sup>12</sup> *Ibid.*, p. 22.

<sup>13</sup> Oakley, P. *et al.*, *Projects With People: The practice of participation in rural development* [Geneva: International Labour Office, 1991], p. 194.

project, and the people are forced<sup>14</sup> to participate actively in its implementation. Then, various types of seedlings (as defined in the project) are distributed to civil servants, army personnel and the public to be planted on selected locations. Project documents are well prepared and sent to the Forestry Department in Jakarta reporting the number of new trees planted and their respective areas. Unfortunately, the selected locations for reforestation are public lands. This is the way the project has been carried out since the 1980s without much success. Very often, project beneficiaries - shifting cultivators and other local community members - are not involved in the process of setting objectives and further maintenance. Nevertheless, local involvement at this early stage of the planning process is essential, and so is a good understanding of local communities and their social and economic groupings. This top-down approach is no more than some kind of a manipulable mechanism for achieving project objectives.

'Education as awareness', on the contrary, tends to focus on the basic dynamic of the people. The people or groups of people are seen as the first step which ensures the basis for sustained participation. This process allows the groups to understand, analyse and interpret the issues which directly affect their livelihood. Thus, education as awareness can be seen as a 'basic precondition for developing and sustaining participation'.

Principally, Paulo Freire<sup>15</sup> argued that poor rural people, marginalised, oppressed and made dependent by an external dominance which rigidly supported the *status quo*, could reverse this situation by breaking the mythological barriers which enforced their marginalisation. Freire asserted that through an educational process in which the poor people acted as 'subjects' of their own development and not 'object' of another person's development, they could surface and actively

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<sup>14</sup> The term 'forced' is deliberately applied here because in practice if one does not participate, he/she will be considered an 'anti-development' element who needs to be watched.

<sup>15</sup> Freire, P., *Education: The practice of freedom* [London: Writers and Readers Publishing Co-operative, 1974]. Quoted in Oakley, P. *et al.* [1991] p. 195.

intervene in the forces which influenced their development.

Given that background, the process for a sound environmental education in East Timor should begin with people structuring and explaining the dynamics of their own reality, that involves the social, economic and political context in which they gain a livelihood. Oakley *et al.* <sup>16</sup> stated that this structuring of reality helped to develop people's critical faculty, in which they move from passively accepting the content of their reality to critically examining it and analysing its contradictions. As people's critical faculty develops, they will be able to look at their own situation and begin to take responsibility for shaping their lives and their environment. In fact, bureaucrats should recognise that no one knows the reality better than the people themselves. Therefore, it should be noted that local people have the right and duty to design, make decisions and implement community activities that concern their own lives. Here, the people become fundamental elements in their action and not merely passive watchers.

The whole purpose of awareness creation is seen as empowering rural people; that is, equipping them with the analytical and action-oriented skills necessary for them to become actively involved. This empowering is seen by Delion as having three major dimensions:

- power through greater confidence in their ability to take action successfully;
- power in terms of the increasing relations they establish with other organisations, thus broadening their basis of operation;
- power as a result of their increasing access to the economic resources, e.g. credit and inputs, which will help their development. <sup>17</sup>

Though any action to bring about any fundamental changes in people's attitudes, especially on the issues related to the 'empowerment' of the poor is

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<sup>16</sup> *Ibid.*, pp. 195-6.

<sup>17</sup> Delion, J., *Objectives, pedagogy and institution of participation in rural development* [Hawaii: East-West Centre, 1986]. In Oakley, *Op. Cit.*, p. 196.

quintessentially political, both awareness and empowerment of community are indispensable for the sustainable development process to succeed. Awareness creation and empowerment take time and these, as we have seen, are at a *premium* in development projects. In the context of environmental education, particularly for swiddeners, the creation of awareness will remain an important first building-block of a process of their involvement.

### *Carrying Out The Program*

Given the uniqueness context of East Timor, this section deals with two important issues associated with the way the environmental education program should be implemented. The two crucial issues are relating to awareness-creation and programs or projects with outside intervention. Indeed, changing land use practices from unsustainable to sustainable ones is not easy when the number of the poor is growing and the land base is fixed, as is the case in the north coast of East Timor. However, there should not be any room for complacency and a slacking off in efforts. As a matter of fact, a number of countries have achieved greater environmental stability, food security, and improved resource management during the past twenty years.

#### A. Issues Relating to Awareness-Creation

Understanding and involving local communities early in the planning process should be the first step in the project design for environmental education. Project planners must take the time to understand the swiddeners' structure, workings and incentives. The issue is not whether or not project planners need community information, but how much they need and how accurate it should be. Here, the answer will depend directly on the nature of the communities involved, the budget

available, land use system, the local environment, and the time and other constraints surrounding the project being planned.

Learning about local communities, their existing knowledge and practices is important before planning and initiating any activity in a community. In most cases, local people already have substantial knowledge base in planting trees and producing seedlings. The local people often have quite a thorough understanding of how different tree species meet their needs. However, too often, project planners ignore this knowledge and experience.

Conflicts between land uses and between community groups about communal lands should be reduced. It should be noted that this step is not merely a matter of 'resettling' communities. Project designers should be able to identify potential conflicts and address them early, preferably prior to field operations. Information on the incentive and conflict resolution systems operating in involving these communities must be obtained at an early stage.

Several ways to deal with conflicts or potential conflicts are, among others, providing land rights to various households, making sure that every household in the community will benefit from the project or program, ensuring that all community members understand the project and the rules and regulations involved and, making use of unproductive lands that have not being used for livestock or cropping. Before the implementation of the following step, this phase must gain full support from traditional leaders. Normally, this support is accompanied by a traditional ceremony.

Begin with small and simple and build up involvement through demonstration plots. As we have seen, the reforestation projects that started too big, and with high expectations, have failed. For example, every three to four households in the village will be responsible for 1,000-2,000 square metres of land to facilitate control from fire risk. This piece of land will serve as a demonstration plot that can also function as a laboratory. In the context of East Timor, the piece of land should be classified as 'rai téen' (or communal land on shifting field). Because 'rai téen' is highly valued by the Timorese, it can be a form to tie households to the land motivating them to conserve it. This approach may induce the Timorese to feel more responsible for

his/her land in conserving fertility and in preventing erosion. Then, planners should be able to provide species that are easy to plant and tend under a wide variety of site and planting conditions. On these demonstration plots, it is important to maintain a high seedling survival to avoid discouragement.

Incentives should be provided for farmers to grow more trees and protect them. These incentives can be in various forms. For example, credit that farmers cannot normally obtain through monetary agencies, can be channelled through government co-operatives with subsidised interest rates; services provided free such as education and public infrastructure such as community health centres and water supply. The effects that these incentives may bring are, among others, better access to resources, and can increase tree grower's knowledge about their environment.

#### B. Issues Relating to Outside Interventions

Outside intervention or support is necessary for successful implementation of this integrated environmental education program. In essence, outside interventions (support services) help to meet local prerequisites for new or expanded reforestation activity on these 'rai téen', which provide benefits for the local communities involved. These interventions can contribute directly to overcoming problems of deforestation. Therefore, it is necessary that policy makers formulate a separate legislative support to this bottom-up approach. Furthermore, because of the necessary close ties between 'rai téen' and forestry and agricultural departments, and rural development in general, legislation may be needed to establish appropriate and effective policies to support and legitimise this integrative program.

Consequently, government departments should be able to review past and existing reforestation projects. Recognising past failures, future plans should be flexible as to adjust to these specific conditions. Decision makers at the central level, Jakarta, must be open to suggestions.

Working with the right local leaders and institutions, including NGOs (Non-Governmental Organisations) will also contribute to the sustainability of this environmental education program. Experience from various parts of East Timor shows that successful programs were due to the involvement of schools, local women's organisations, co-operatives, the Church, and other local voluntary organisations. No group should be excluded from consideration. One example of this is the community-based agriculture management in Racemate (80 kilometres north of the capital city, Dili) that has been developed by ETADEP or 'Ema maTA Dalan ba Progresso' (formerly, East Timor Agricultural Development Program), one of the biggest NGOs in East Timor.

#### *Concluding Comments*

This paper has discussed some practical tools in the process of planning, organising, and implementing environmental education programs for shifting cultivators in the East Timor context. Some important points were raised in association with education as awareness, each of which needs to be considered in a practical context for each new situation. Reforestation programs in East Timor must be revised in accordance with the specific social, economic and cultural context of the Timorese people.

#### **References cited:**

- Allaby, M., *Macmillan Dictionary of the Environment*, 3rd edition [London: The Macmillan Press Ltd., 1988].
- Arnold, J.E.M., 'Deforestation' in D.J. Maclaren and B.J. Skinner, eds., *Resources and World Development*, [New York: John Wiley and Sons, 1987].

BAPPEDA, *Timor Timur Dalam Angka 1993* [Propinsi Daerah Tingkat I Timor Timur, 1994].

Ben-Peretz, M., 'Environmental education is too important to be left in the hands of teachers alone' in Trilochan S. Bakshi and Zev Naveh, eds., *Environmental Education: Principles, Methods and Applications* [London: Plenum Press, 1980].

Biro Lingkungan Hidup, *Neraca Kependudukan dan Lingkungan Hidup Timor Timur* [Pemerintah Daerah Tingkat I Timor Timur, 1993].

Delion, J., *Objectives, pedagogy and institution of participation in rural development* [Hawaii: East-West Centre, 1986].

Freire, P., *Education: The practice of freedom* [London: Writers and Readers Publishing Co-operative, 1974].

Metzner, J.K., *Man and Environment in Eastern Timor: a geo-ecological analysis of the Baucau-Viqueque Area as a possible basis for regional planning*. Development Studies Centre, Monograph No. 8 [Canberra: The Australian National University, 1977].

Oakley, P. et al., *Projects With People: The practice of participation in rural development* [Geneva: International Labour Office, 1991].

Spencer, J.E. (1987) *Shifting Cultivation in Southeastern Asia* [Berkeley: University of California Press, 1987].

Stocker, L., (Course Co-ordinator), *Workshop on Sustainable Development - S541* [Murdoch: Murdoch University: Institute for Science and Technology Policy, 1995].